DISCUSSION OF THE AMENDMENT

Claim 10 has been amended by incorporating the subject matter of Claim 12 therein; Claims 11 and 12 have been canceled. Claim 20 has been amended to be consistent with the amendment to Claim 10.

No new issue or new matter is believed to have been raised or added by the above amendment. With entry thereof, Claims 10 and 13-26 will be pending in the application. All would be active except Claim 18, which is drawn to a non-elected invention.

REMARKS

Regarding withdrawn Claim 8, Applicants defer any petition pursuant to 37 CFR 1.144.

The rejections of Claims 10-17 and 19-26 under 35 U.S.C. § 103(a) as unpatentable over:

US 2002/0172640 (Hibi et al) in view of US 2008/0047872 (Iaccino et al) and US 3,482,946 (Shirk), and

Hibi et al in view of U.S. 5,573,657 (Degnan et al) and Shirk,

are respectfully traversed.

Applicants submit that all the arguments in traversal of these rejections in the previous response still apply, which arguments are incorporated by reference. Independent Claim 10 as above-amended is even further removed from the applied prior art.

As recited in above-amended Claim 10, an embodiment of the present invention is a process for carrying out an exothermic chemical equilibrium reaction in a fluidized-bed reactor comprising a fluidized bed and a gas distributor, wherein there is a temperature distribution along the flow direction in the fluidized bed of the fluidized-bed reactor and **the temperature difference between the lowest temperature and the highest temperature is at least 10 K** and **wherein the temperature within the fluidized bed decreases from an absolute temperature maximum along the flow direction to the surface of the fluidized bed and to the gas distributor**, and

wherein **the distance between the absolute temperature maximum and the gas distributor is smaller than the distance between the absolute temperature maximum and the surface of the fluidized bed**.

(Emphasis added).

As previously noted, Hibi et al discloses a process for producing chlorine by oxidizing hydrogen chloride with oxygen in the presence of a supported ruthenium oxide catalyst (Abstract), which process can be carried out in a reactor such as a fixed bed reactor, fluidized reactor, tank type reactor, and the like [0067]. Hibi et al discloses further that the fluidized bed system has an advantage that the temperature distribution width in the reactor can be reduced because heat in the reactor can be sufficiently removed [0068]. However, there is no disclosure or suggestion in Hibi et al that the temperature within the fluidized bed decreases from an absolute temperature maximum along the flow direction to the surface of the fluidized bed.

As previously noted, Iaccino et al discloses a process for converting methane to liquid hydrocarbons in at least two reactors in series, such as in multiple catalyst beds with heat removal between beds, and wherein the lead bed(s) may be operated at higher temperatures to maximize kinetic rates and the tail bed(s) may be operated a lower temperatures to maximize thermodynamic conversion [0098]. However, there is neither disclosure nor suggestion in Iaccino et al that the distance between the absolute temperature maximum and the gas distributor is smaller than the distance between the absolute temperature maximum and the surface of the fluidized bed.

As previously noted, Shirk discloses a reactor for effecting contact between vaporous reactants and finely-divided solids. The reaction zone is compartmented by vertically-spaced, perforated trays. The compartments each comprise devices to set the temperature in the compartments, e.g. tubes through heating medium or cooling medium flows. However, like Iaccino et al, there is neither disclosure nor suggestion in Shirk that the distance between the absolute temperature maximum and the gas distributor is smaller than the distance between the absolute temperature maximum and the surface of the fluidized bed.

Degnan et al discloses a hydrogenation process for reducing the unsaturation of lubricants, which uses a catalyst based on ultra-large pore crystalline material (Abstract) and that for an exothermic process such as hydrogenation, it is thermodynamically favored by lower temperatures but for kinetic reasons, moderately elevated temperatures are normally used and for petroleum refining processes, temperatures in the range of 100° to 700°F are typical (column 1, lines 32-36). However, like Iaccino et al and Shirk, there is neither disclosure nor suggestion in Degnan et al that the distance between the absolute temperature maximum and the gas distributor is smaller than the distance between the absolute temperature maximum and the surface of the fluidized bed.

Presumably based on Iaccino et al, the Examiner holds that it would have been obvious to optimize the temperature difference between the lead bed and the tail bed to maximize both the kinetic rate and the thermodynamic conversion in the process of Hibi et al. The Examiner continues that it would have been obvious to carry out this modified process of Hibi et al in a single fluidized bed reactor as suggested by Shirk "because this reactor is compartmented and each component can serve as a 'bed' as suggested in [Iaccino et al] and the temperature in each compartment can be controlled independently to obtain the higher and lower temperatures as desired by [Iaccino et al]."

Based on Degnan et al, the Examiner holds that it would have been obvious to maximize both the kinetic rate and the thermodynamic conversion for the process of Hibi et al by operating the fluidized bed at two different temperatures, i.e., at a higher temperature for kinetic reasons and lower temperature for thermodynamic reasons, as suggested by Degnan et al, and that it would have been obvious to use the apparatus of Shirk.

In reply, in none of the applied prior art is there a hint that the above-emphasized temperature distribution of above-amended Claim 10 leads to an improved space-time yield. Nor is there a hint in this prior art that a temperature distribution in which the distance

between the absolute temperature maximum and the gas distributor is smaller than the distance between the absolute temperature maximum and the surface of the fluidized bed has the advantage that catalyst systems containing active components which are volatile at elevated temperatures, as ruthenium compounds, can be operated with better long-term stability.

In addition, a temperature distribution as recited in above-amended Claim 10 has the further advantage that heat exchange capacities and thus capital costs can be reduced, since a smaller quantity of heat has to be transferred to the feed gases and the quantity of heat to be removed from the fluidized bed by means of heat exchangers is smaller, since the colder feed gas can take up a major part of the heat liberated in the exothermic reaction directly in the fluidized bed.

None of the above could have been predicted by the applied prior art.

For all the above reasons, it is respectfully requested that the rejections be withdrawn.

Applicants respectfully submit that all of the presently-active claims in this application are now in immediate condition for allowance. Accordingly, the Examiner is respectfully requested to pass this application to issue.

Respectfully submitted,

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